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Title of Document Transmitted:	**TRANSMITTAL DOCUMENTS (2) AND BRIEF OF APPELLANTS**
Applicant:	Clinton A. Staley et al.
Serial No.:	09/672,352
Filed:	September 28, 2000
Group Art Unit:	2613
Title:	VARIABLE BIT-RATE ENCODING
Our Ref. No.:	G&C 30566.274-US-01

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Due Date: May 9, 2006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Clinton A. Staley et al.	Examiner:	Allen C. Wong
Serial No.:	09/672,352	Group Art Unit:	2613
Filed:	September 28, 2000	Docket:	G&C 30566.274-US-01
Title:	VARIABLE BIT-RATE ENCODING		

CERTIFICATE OF MAILING OR TRANSMISSION UNDER 37 CFR 1.8

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By:
Name: Jason S. Feldmar

Commissioner for Patents
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Alexandria, VA 22313-1450

Dear Sir:

We are transmitting herewith the attached:

- ☒ Transmittal sheet, in duplicate, containing a Certificate of Mailing or Transmission under 37 CFR 1.8.
- ☒ Brief of Appellant(s).
- ☒ Charge the Fee for the Brief of Appellant(s) in the amount of $500.00 to the Deposit Account.

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By:
Name: Jason S. Feldmar
Reg. No.: 39,187
JSF/kmk

Due Date: May 9, 2006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of:	)	
	)	
Inventor: Clinton A. Staley et al.	)	Examiner: Allen C. Wong
	)	
Serial No.: 09/672,352	)	Group Art Unit: 2613
	)	
Filed: September 28, 2000	)	Appeal No.: ________
	)	
Title: VARIABLE BIT-RATE ENCODING	)	

BRIEF OF APPELLANTS

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In accordance with 37 CFR §41.37, Appellants hereby submit the Appellants' Brief on Appeal from the final rejection in the above-identified application, as set forth in the Office Action dated March 3, 2006.

Please charge the amount of $500.00 to cover the required fee for filing this Appeal Brief as set forth under 37 CFR §41.37(a)(2) and 37 CFR §41.20(b)(2) to Deposit Account Number 50-0494 of Gates & Cooper LLP.

Also, please charge any additional fees or credit any overpayments to Gates & Cooper LLP.

I. REAL PARTY IN INTEREST

The real party in interest is Autodesk, Inc.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences for the above-referenced patent application.

III. STATUS OF CLAIMS

Claims 1, 4-6, 8-19, 21, and 23-31 are pending.

Claims 2, 3, 7, 20, and 22 have been cancelled.

Claims 1, 4-6, 8, 12-14, 16-19, 21, 23, and 26-31 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Lim (5,638,126) in view of Linzer (6,038,256).

Claims 9-11, 15, and 24-25 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Lim, Linzer, and in view of Gonzales (5,231,484).

All of the above rejections are being appealed.

IV. STATUS OF AMENDMENTS

Subsequent to the final Office Action, claim 19 was amended. Pursuant to the Advisory Action dated March 3, 2006, the amendment was entered for purposes of this appeal.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Independent claims 1, 16, and 19, are generally directed to encoding data (see page 1, line 17). More specifically, a separate function for each frame (having data for an image) in a sequence of frames is determined (see page 2, lines 4-8; page 6, lines 1-12; FIG. 3, process 50 and step 52). Each function relates encoding size to encoded quality for each frame in the sequence of frames (see page 6, lines 1-12 and FIG. 3, step 52).

The independent claims continue and provide that prior to encoding any of the frames, all of the separate functions are searched to determine a best quality value for encoding the sequence of frames (see FIG. 3, step 54; page 5, lines 1-12). The independent claims further provide that the encoded size of the frames satisfy one or more constraints that are associated with either a transmission line bandwidth, a receiver buffer size, or a total compressed size (see page 6, lines 1-12; FIG. 3, steps 54-58).

Once the separate functions have been searched and a best quality value is determined, each of the frames in the entire sequence are encoded in/with the determined best quality value (see page 6, lines 13-21; FIG. 3, steps 56-60).

Once encoded, the process determines whether each encoded frame satisfies various constraints and if satisfied, the sequence of encoded frames is transmitted (see page 6, lines 13-21; FIG. 3, steps 56-60).

In view of the above, it can be seen that multiple separate functions are determined and the functions are then searched to determine a best quality value to use for encoding all of the frames. Once the best quality is determined, all of the frames are encoded with the best quality value and then transmitted if the encoded frames satisfy various constraints.

In addition, as set forth in dependent claims 27, 28, and 30, if one or more encoded frames do not satisfy the constraints, the process repeats by determining a new separate function that is based on the prior determining and search steps (see page 6, lines 22-29). Thereafter, the search, encoding, and determining steps (i.e., of whether the encoded frames satisfy the constraints) are repeated based on the new function (see page 6, lines 22-29).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1, 4-6, 8, 12-14, 16-19, 21, 23, and 26-31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lim (5,638,126) in view of Linzer (6,038,256).

Claims 9-11, 15, and 24-25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lim, Linzer, and in view of Gonzales (5,231,484).

Appellants request review of all of these grounds of rejection.

VII. ARGUMENT

A. Independent Claims 1, 16, and 19 Are Patentable Over The Prior Art

In paragraphs (1)-(2) of the Office Action, claims 1, 4-6, 8, 12-14, 16-19, 21, 23, and 26-31 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lim, U.S. Patent No. 5,638,126 (Lim) in view of Linzer, U.S. Patent No. 6,038,256 (Linzer). On page (10) of the Office Action,

claims 9-11, 15, and 24-25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lim and Linzer in view of Gonzales, U.S. Patent No. 5,231,484 (Gonzales).

Specifically, the independent claims were rejected as follows:

> Regarding claims 1 and 19, Lim discloses a program storage media storing computer executable instructions, the instructions to cause a computer to:
>
> determining a separate function for each frame in a sequence of frames, each function relating encoded size to encoded quality for each frame in a sequence of frames, each frame having data for an image (fig. 1, element 10 is the controller connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 110, where a sequence of frames is sent through the encoding system of fig. 1 in that since Lim's invention uses an MPEWG encoder for encoding a plurality of images, I, P and B frames, each frame within that sequence of frames (GOP) have different sizes, and further, note quantization controller 10, there is a selector 160 that decides which quantization parameter to use on the evaluated frame(s) in order to properly allocate the number of bits to the evaluated frame(s) for efficient coding);
>
> performing a search of all of the separate functions to determine a best quality value for encoding the sequence of frames whose encoded sizes satisfy one or more constraints, the constraints being associated with one or more of a transmission line bandwidth, a receiver buffer size and a total size constraint (fig. 1, element 10 is the controller connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 110, where the process of generating the encoded data at an acceptable bit rate for transmission in that a recursive process is done to monitor the quality of the encoded bit frames by checking on the buffer fullness to determine the total size constraint, and note Qp adjuster 130 adjusts the quality of the encoded frames and element 160 selects the best quality value Qp, thus, best quality value is ascertained; see col.3, ln.47-53);
>
> encode each frame of the entire sequence of frames with the determined best quality value (fig. 1, note Qp adjuster 130 adjusts the quality of the encoded frames and element 150 selects the best quality value Qp, and coder 110 utilizes the information from quantization parameter deciding block 10 for coding with the best quality value);
>
> determine whether each encoded frame satisfies the constraints (fig. 1, note a recursive process is done to monitor the quality of the encoded bit frames by checking on the buffer fullness to determine the total size constraint to determine whether the frame satisfies the constraints); and
>
> if the encoded frames satisfy the constraints, order transmission of frames of the sequence (fig. 1, note data from buffer 120 is transmitted to transmission for transmission of frames of the sequence of images).
>
> Lim does not specifically disclose the prior to encoding any of the frames that performs a search of all frames in the sequence of frames for a best quality value. However, Linzer teaches that prior to encoding any of the frames, there is an execution of searching of all the frames prior to encoding any of the frames (fig.3, element 24 and col.5, ln.63-67 and col.6, ln.9-13 and ln.25-26, note the statistics gatherer 24 obtains a search of all frames from the video sources to obtain a best quality value prior to encoding any of the frames). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Lim and Linzer, together as a whole, for gathering all of the possible pre-encoding data so as to efficiently encoding high quality images in an accurate, precise manner (Linzer col.3, ln.64 to col.4, ln.13).
>
> Regarding claim 16, Lim discloses a system for encoding image frames, the system comprising:
>
> a controller connected to receive data on sizes on image frames that are part of a sequence of image frames (fig. 1, element 10), to be encoded by the encoder and to control quality of the encoded frames produced by the encoder based on :
>
> determination of a separate function for each image frame in the sequence of image frames, each function relating encoding size to encoded quality for each frame in the sequence of frames

(fig.1, element 10 is the controller connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 110, where a sequence of frames is sent through the encoding system of fig.1 in that since Lim's invention uses an MPEG encoder for encoding a plurality of images, I, P and B frames, each frame within that sequence of frames (GOP) have different sizes, and further, note quantization controller 10, there is a selector 160 that decides which quantization parameter to use on the evaluated frame(s) in order to properly allocate that number of bits to the evaluated frame(s) for efficient coding);

a search of all of the separate functions to determine a best quality value for encoding the sequence of frames whose encoded sizes satisfy one or more constraints, the constraints being associated with one of a bandwidth of a transmission line, space in a receiver buffer and a total compressed size (fig. 1, element 10 is the controller connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 100, where the process of generating the encoded data at an acceptable bit rate for transmission in that a recursive process is done to monitor the quality of the encoded bit frames by checking on the buffer fullness to determine the total size constraint, and note Qp adjuster 130 adjusts the quality of the encoded frames and element 160 selects the best quality value Qp, thus, best quality value is ascertained; see col.3, In.47-53); and

a variable bit rate encoder controlled by the controller configured to encode each frame of the entire sequence of frames with the determined best quality value, wherein the controller is further configured to determine whether each encoded frame satisfies the constraints, and if the encoded frames satisfy the constraints, transmitting the sequence of encoded frames (fig., element 110 is the variable bit rate encoder controlled by the controller 10 connected to the buffer 120 that receives various sizes or amounts of frame image data encoded by coder 110, where the process of generating the encoded data at an acceptable bit rate for transmission in that a recursive process is done to monitor the quality of the encoded bit frames by checking on the buffer fullness to determine the total size constraint, and note Qp adjuster 130 adjusts the quality of the encoded frames and element 160 selects the best quality value Qp, thus, best quality value is ascertained; see col.3, In.47-53).

Lim does not specifically disclose the *prior to encoding* any of the frames that performs a search of all frames in the sequence of frames for a best quality value. However, Linzer teaches that prior to encoding any of the frames, there is an execution of searching of all the frames prior to encoding any of the frames (fig.3, element 24 and col.5,In.63-67 and col.6, In.9-13 and In.25-26, note the statistics gatherer 24 obtains a search of all the frames from the video sources to obtain a best quality value prior to encoding any of the frames). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Lim and Linzer, together as a whole, for gathering all of the possible pre-encoding data so as to efficiently encoding high quality images in an accurate, precise manner (Linzer col.3, In.64 to col.4, In. 13).

Appellants traverse the above rejections for one or more of the following reasons:

(1) Neither Lim, Linzer, nor Gonzales teach, disclose or suggest a separate function, for each frame in a sequence of frames, that relates encoded size to encoded quality for each frame;

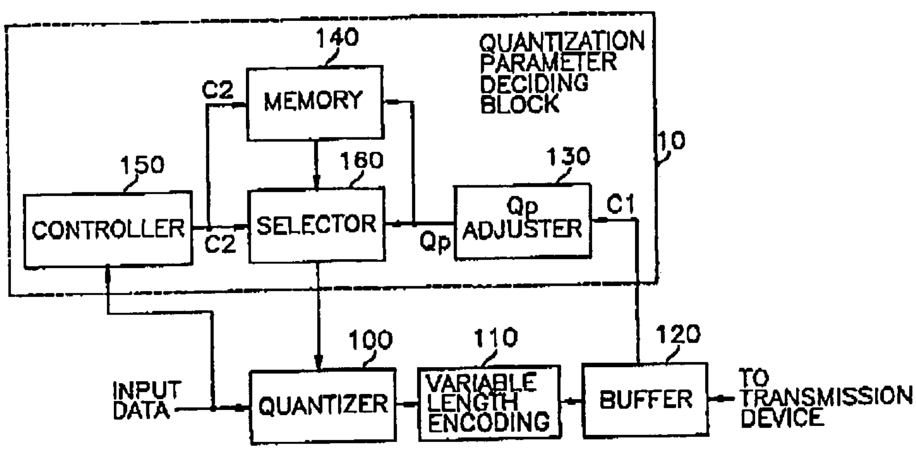
(2) Neither Lim, Linzer, nor Gonzales teach, disclose or suggest a search of all of the separate functions to determine a best quality value to encode the entire sequence;

(3) Neither Lim, Linzer, nor Gonzales teach, disclose or suggest encoding each frame using the same determined best quality for all of the frames; and

(4) Lim teaches away from searching all of the separate functions prior to encoding any of the frames.

The cited references do not teach nor suggest various elements of Appellants' independent claims.

In rejecting the function-related aspects of the claims, the Office Action relied on Lim Fig. 1 that provides:



Appellants note that in Lim, a video signal encoding apparatus is used to convert blocks into coefficients that are then processed by a quantization circuit. The quantization circuit (referred to as quantizer 100) merely receives a quantization parameter (Qp) that is used with a matrix of base quantization step sizes to determine what data should be output (see col. 3, lines 15-36). However, the Qp used by the quantization circuit is determined via the quantization parameter deciding block 10 of Fig. 1. As described in Lim, such a deciding block 10 determines the Qp merely based on the fullness of the buffer (see col. 3, lines 47-53) and the particular slice of a frame that is currently being encoded (see col. 3, line 58- col. 4, line 20). In this regard, Lim describes a frame that is made up of multiple slices. Further, Lim indicates that the image characteristics of the first slice of a current frame are not much different from those of the second slice of a preceding frame. Accordingly, the end result that Lim produces is that a Qp for a second slice (of a preceding frame) is used as the Qp for the first slice of a current frame (see col. 4, lines 8-20). Again, the Qp is based on a buffer fullness (and the current slice being processed) and is processed with a matrix of base quantization steps to determine a particular size of quantized data to generate (see col. 3, lines 20-35). Further,

Lim explicitly states that the Qp for other slices are NOT stored in memory 140 (see col. 3, lines 63-64).

However, contrary to the present claims, Lim does not even remotely describe a function for each frame in a sequence. Further, Lim does not teach, describe, suggest, allude to, or hint at a function that relates encoded size to encoded quality for each frame in a sequence. In addition, Lim does not perform a search of all such functions to determine a single best quality value that is used to encode all of the frames in a sequence. In this regard, the Office Action attempts to assert that the use of an MPEG encoder and a selector that decides which Qp to use, is equivalent to the functions determined in the present invention. Appellants respectfully disagree. The mere selection of a Qp does not and cannot teach, disclose, or suggest a function that is determined for each frame in a sequence. Nor does such a selection take into account that all of such functions are searched before encoding any of the frames. Accordingly, Lim fails to teach various aspects for which it has been asserted.

In response to some of the above previously submitted arguments, the final Office Action (that is repeated in the Advisory Action) asserts:

> Regarding lines 2-3 on page 10 and lines 10-11 on page 11 of applicant's remarks, applicant asserts that neither Lim, Linzer nor Gonzales teach, disclose or suggest a separate function, for each frame in a sequence of frames, that related encoded size to encoded quality for each frame. The examiner respectfully disagrees. In fig. 1, Lim discloses the controller 10 is connected to the buffer 120 that receives various amounts of sizes of image frames encoded by coder 110, in that a sequence of frames is sent through the encoding system of fig. 1 in a recyclical or recursive manner that applies an MPEG video image encoding recursive rate control encoding scheme for encoding a plurality of images, I, P and B frames. Each frame within that sequence of frames (GOP) have different sizes. Further, Lim's fig. 1, there is a quantization controller 10 and a selector 160 that decides which quantization parameter to use on the evaluated frame(s) in order to properly allocate the number of bits to the evaluated frame(s) for efficient coding. Thus, Lim teaches a separate function, for each frame in a sequence of frames, that relates encoded size to encoded quality for each frame.

Appellants respectfully traverse and disagree with these assertions. Firstly, the Action states that the Lim's controller 10 is connected to the buffer 120. Appellants note that item 10 is the quantization parameter deciding block and is not the controller. To the contrary, the controller is item 150. While the deciding block 10 is connected to the buffer 120, the controller 150 is not connected to the buffer 120. The buffer is receiving encoded video data that is generated by variable length encoding block 110 (see col. 3, lines 37-40). The Action then asserts that the use of a quantization controller 10 and a selector 160 that decides which quantization parameter to use on an

evaluated frame in order to properly allocate the number of bits to the evaluated frame for efficient coding reads on a separate function for each frame in a sequence of frames. Such an assertion is wholly without merit.

Again, Lim is merely determining a Qp value to use to encode a particular slice of a frame. In this regard, a function for an entire frame among a sequence of frames is not determined. A complete function for a frame is never determined in any manner whatsoever. Thus, Lim is not determining a function whatsoever for an entire frame. Instead, a Qp is determined on a slice by slice basis without any consideration of the entire frame (as claimed).

Further, the Qp value and/or the recursive function of Lim completely fails to relate encoded size to encoded quality for each frame in a sequence. In this regard, Lim merely looks at the buffer fullness and the current slice that is being encoded. Thereafter, Lim determines which Qp to use based on the second preceding slice. Such an evaluation completely disregards the encoded size versus the encoded quality or the creation of any relationship whatsoever.

In addition, it is noted that since Lim requires the value of the current slice that is being encoded in order to determine the Qp to utilize (see col. 3, line 47-col. 4, line 8), it is impossible to perform a search of the various functions prior to encoding any of the frames. Instead, Lim encodes each slice in real time dynamically while examining the buffer and the slice that is being encoded. By dynamically encoding such information, it is impossible to perform a search of all of the functions prior to encoding any frames. In this regard, Lim actually teaches away from the claimed methodology that teaches the performance of a search prior to encoding any of the frames.

In addition, Appellants note that Linzer also fails to cure the deficiencies of Lim. The Office Action relies on Linzer for the prior search aspects of the claims. Appellants respectfully traverse such reliance on Linzer. Namely, as claimed, the search is conducted across the separate functions and not of the frames. Further, the search of the functions is used to determine a best quality value for encoding the entire sequence of frames in view of various constraints. Linzer teaches the gathering of statistics regarding video signals and that are indicative of the complexity of a signal that is generated before a bit allocation decision is made (see col. 5, lines 63-67; col. 6, lines 9-11). However, the mere existence of statistics does not teach the use or determination of a function that is based on such statistics. Again, the claims are directed towards determining a separate function

for each frame in a sequence, and not merely a collection of statistics regarding each frame. As claimed, the function relates encoded size to encoded quality. Further, the functions are searched to determine a best quality value. Linzer lacks any capability, suggestion, or motivation to create a function or to search various functions to determine the best quality value for encoding all of the frames in a sequence.

In view of the above, Appellants submit that both Lim and Linzer clearly lack any description of a function, the determination of a function, or the searching of numerous functions as claimed. The other cited references also fail to cure the defects of Lim and Linzer.

In response to some of the above arguments, the final Office Action (that is repeated in the Advisory Action) provides:

> Regarding lines 4-7 on page 10 and lines 11-14 on page 11 of applicant's remarks, applicant contends that neither Lim, Linzer nor Gonzales teach, disclose, or suggest a search of all of the separate functions to determine a best quality value to encode the entire sequence, and encoding each frame using the same determined best quality value for all of the frames. The examiner respectfully disagrees. In fig. 1, Lim discloses an MPEG video image encoding recursive rate control encoding scheme, as elaborated in the above arguments. Note the buffer 110 is image data storage that can store images of various sizes in that a recursive process is done to monitor the quality of the encoded bit frames by checking on the buffer fullness to determine the total size constraint. The Qp adjuster 130 of Lim's fig. 1 adjusts the quality of the encoded frames and element 160 selects the best quality value Qp out of a plurality of quality values obtained by functions performed by Qp adjuster and evaluation of the multitudes of degrees of buffer fullness. Thus, best quality value is ascertained and searched, as disclosed in col. 3, ln. 47-63. Therefore, Lim discloses a search of all of the separate functions to determine a best quality value to encode the entire sequence, and encoding each frame using the same determined best quality value for all of the frames.

Appellants respectfully traverse and disagree with such an assertion. As stated above, Lim merely looks to the buffer fullness and the Qp value of a second preceding frame to determine a Qp value to use when encoding the current frame. Such a teaching does not and cannot teach a search of numerous functions that all relate encoded size to encoded quality and determining a best quality value for all of the frames based on the search of all of the separate functions. Again, merely adjusting a Qp value based on two factors does not teach a function or a search of a function.

The final Action asserts that Lim teaches a plurality of quality values obtained by functions performed by Qp adjuster and evaluation of the multitudes of degrees of buffer fullness. Such an

assertion is without merit. Contrary to such an assertion, the Qp adjuster does not perform functions to obtain a plurality of quality values. Further, the Qp adjuster also fails to evaluate a multitude of degrees of buffer fullness. Instead, the Qp adjuster merely determines a Qp based on buffer fullness (see col. 3, lines 47-53). Such a determination does not evaluate a multitude of degrees of buffer fullness. In fact, an electronic search of Lim for the term "multitude" provides no results whatsoever. Thus, the assertion in the final Office Action is not based on any teaching of Lim, explicitly or implicitly. In addition, "functions" are not performed by the Qp adjuster. Again, Lim clearly states that the Qp adjuster merely determines the degree of fullness of the buffer and determines the Qp accordingly (see col. 3, lines 47-53). Such a description fails to teach, disclose, and suggest separate functions for each frame in a sequence and searching the entire sequence.

In addition, it is noted that the claims provide that the single determined best quality value is used to encode each frame of the entire sequence of frames. Lim clearly teaches away from such an encoding since each slice uses a separate Qp that is based on buffer fullness and the preceding second slice. Thus, contrary to that asserted in the final Office Action, Lim does not teach encoding each frame of the entire sequence of frames with the determined best quality value (as claimed).

The final Office Action (and Advisory Action) then continue:

> Linzer is used to teach *prior to encoding* any of the frames that performs a search of all frames in the sequence of frames for a best quality value, as disclosed in Linzer's fig. 3, element 24. Also, see col.5, ln.63-67, col. 6, ln.9-13 and ln.25-26, where the statistics gatherer 24 obtains a search of all the frames from the video sources to obtain a best quality value prior to encoding any of the frames. Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Lim and Linzer, together as a whole, for gathering all of the possible pre-encoding data so as to efficiently encoding high quality images in an accurate, precise manner, as suggested in Linzer's column 3, line 64 to column 4, line 13.
>
> Regarding lines 2-4 on page 12 of applicant's remarks, applicant states that there is no motivation in Linzer to combine with Lim. The examiner respectfully disagrees. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in

> the art. See in re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one of ordinary skill in the art to combine the teachings of Lim and Linzer, together as a whole, for gathering all of the possible pre-encoding data so as to efficiently encoding high quality images in an accurate, precise manner, as suggested in Linzer's column 3, line 64 to column 4, line 13.

Firstly, as stated above, Lim teaches away from searching all of the functions prior to encoding any of the frames. Thus, even if Linzer does teach such an aspect (which Appellants traverse), Linzer can not be combined with Lim because of the teaching away aspects. Secondly, the final Office Action explicitly provides that Linzer teaches a search of all of the frames. As stated above, the claims do not provide for searching frames. Instead, the claims provide for searching separate functions for each frame. In this regard, a search of functions is not even remotely equivalent to searching the actual frames. Thus, Linzer completely fails to teach the limitations expressly set forth in the claims.

With respect to the motivation to combine – Appellants again assert that Lim actually teaches away from any combination with Lim as stated above. Further, even if they are combined, the combined teaching would clearly fail to teach the invention since both Lim and Linzer fail to describe the numerous functions, functions that relate encoded size to encoded quality for each frame, a search of such separate functions, and the encoding of all of the frames of an entire sequence of frames based on a best quality value determined from the search of all of the functions. Such claim elements are unique and non-obvious in view of all of the cited references.

Moreover, the various elements of Appellants' claimed invention together provide operational advantages over Lim, Linzer, and Gonzales. In addition, Appellants' invention solves problems not recognized by Lim, Linzer, and Gonzales.

B. <u>Dependent Claim 4 is Patentable Over The Prior Art</u>

Dependent claim 4 provides that the search reduces the search range for the best quality value by subdivision.

In rejecting this claim, the final Office Action merely states "Note claims 4-6, 12-14, 21, and 26-31 have similar corresponding elements."

Such a rejection completely fails to address the limitation of this dependent claim. Namely, the aspect relating to subdivision is not addressed in the independent claims nor in the Office

Actions. Under MPEP §2142 and 2143.03 "To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)."

The Office Action fails to address the explicitly claimed limitations and therefore fails to establish a prima facie case of obviousness.

C. Dependent Claim 5 is Patentable Over The Prior Art

Dependent claim 5 provides that the search is a subdivision search algorithm. Similar to the rejections of claim 4, the Office Action summarily reject this claim merely stating "Note claims 4-6, 12-14, 21, and 26-31 have similar corresponding elements."

Such a rejection completely fails to address the limitation of this dependent claim. Namely, the aspect relating to subdivision is not addressed in the independent claims nor in the Office Actions. Under MPEP §2142 and 2143.03 "To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)."

The Office Action fails to address the explicitly claimed limitations and therefore fails to establish a prima facie case of obviousness.

D. Dependent Claims 6 and 21 Are Patentable Over The Prior Art

These dependent claims provide that the search is a binary search algorithm. Similar to the rejections of claims 4 and 5, the Office Action merely asserts: "Note claims 4-6, 12-14, 21, and 26-31 have similar corresponding elements."

Such a rejection completely fails to address the limitation of these dependent claims. Namely, the aspect relating to binary search algorithms are not addressed in the independent claims nor in the Office Actions. Under MPEP §2142 and 2143.03 "To establish *prima facie* obviousness of

a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)."

The Office Action fails to address the explicitly claimed limitations and therefore fails to establish a prima facie case of obviousness.

E. Dependent Claims 8 and 23 Are Patentable Over The Prior Art

These dependent claims provide that each encoded frame produces a group of temporally encoded pictures.

In rejecting these claims, the Office Action asserts that Lim uses an MPEG encoder for encoding a sequence of images wherein the plurality of frames are I, P, and B frames, and that these are temporal.

Firstly, Lim merely mentions MPEG encoding. Secondly, there is no reference or indication of I, P, or B frames in Lim.

In addition, the claims provide that the encoded frame produces a group of temporally encoded pictures and not an MPEG encoded frame. In this regard, I, P, and B frames are not groups of temporally encoded pictures but are merely frames that reference other frames (i.e,. P or B frames) or frames that are independent and are not dependent on other frames (i.e., I frames). Such a teaching is not even remotely similar to that set forth in these dependent claims.

Accordingly, Appellants submit that these claims are in condition for allowance.

F. Dependent Claims 9, 17, and 24 Are Patentable Over The Prior Art

Dependent claims 9, 17, and 24 provide that each act of determining a separate function comprises multiple steps. First, a plurality of pairs of encoded quality and encoded size values for each frame of the sequence from encoded frame data is computed. A functional relationship is then determined between the values of the encoded quality and the encoded size for the quality of frames from the pairs of values.

In rejecting these claims, the final Office Action provides:

> Regarding claim 17, Lim discloses wherein the controller is configured to determine a relation between quality of an encoded image frame and amount of encoded data from the received size data (col. 3,ln.47-53 and fig. 1, note Qp adjuster 130 adjusts the quality of the encoded frames and element 160 selects the best quality value Qp based on the data obtained from the buffer 120).

Appellants respectfully traverse these rejections. Firstly, col. 3, lines 47-53 provide:

> A signal C1 denoting the degree of fullness of the buffer 120 is also coupled to the Qp adjuster 130. At the Qp adjuster 130, the quantization parameter is determined depending upon the degree of fullness of the buffer 120 in a same manner as the prior art quantization parameter deciding scheme. Qp decided at the Qp adjuster 130 is fed to the selector 160 and to the memory 140.

Such text clearly provides that evaluating the fullness of a buffer and selecting a value based on such a value. However, a plurality of pairs of encoded quality and encoded size values for each frame are not even remotely disclosed or suggested, explicitly or implicitly. Further, without disclosing such multiple pairs of values, Lim cannot possibly describe the determination of a functional relationship from such pairs of values (as claimed).

Again, all of the words of a claim must be considered and cannot merely be ignored. The Office Action ignores the claim limitations relating to the pairs of values and therefore fails to establish a prima facie case of obviousness.

The Office Action then relies on Gonzales to teach these claim elements relying on col. 21, lines 3-33 that provide:

> The following equations describe the update procedure for QP.sub.low, as implemented in the preferred embodiment. Denoting the total number of bits used to code row m and all preceding rows by B(m), and the difference between B(m) and the cumulative target as .DELTA.B(m): ##EQU13## After coding row m, QP.sub.low is updated if .DELTA.B(m).noteq.0 as follows: ##EQU14## where .DELTA.u and .DELTA.l are the differences between the picture allocation A and the upper and lower VBV limits for picture n, respectively:
>
> This strategy updates QP.sub.low based on the total bit allocation error up to the current row, as it relates to the maximum error allowed according to the VBV criterion.

Apparent from this text is that pairs of values of encoded quality and encoded size for each frame of a sequence of encoded frame data is completely and entirely lacking. In this regard, Gonzales completely fails to disclose a plurality of pairs having the explicitly claimed limitations. Instead, Qplow is merely updated. However, pairs are not obtained for each frame of a sequence and such pairs are not used to determine a functional relationship as claimed.

In view of the above, Appellants respectfully request reversal of the Examiner's rejections.

G. Dependent Claims 10, 18, and 25 Are Patentable Over The Prior Art

These dependent claims are dependent on 9, 17, and 24 respectively, and further provide for encoding each frame of the sequence with a plurality of qualities to compute the encoded data sizes associated with each of the plurality of qualities.

The Office Actions reject these claims based on the same language recited in claims 9, 17, and 24. For the reasons stated above, Appellants submit that these claims are patentable over the cited references. In addition, Lim fails to encode each frame in a sequence with a plurality of qualities. In this regard, the specific claim limitations set forth in these dependent claims are not taught, disclosed, or suggested whatsoever.

H. Dependent Claims 11, 29, and 31 Are Patentable Over The Prior Art

These dependent claims provide that the determination of the separate functions are performed across the sequence of frames on multiple processors in parallel.

In rejecting these claims, the Office Action merely states "Note claims 4-6, 12-14, 21, and 26-31 have similar corresponding elements."

Such a rejection completely fails to address the limitation of these dependent claims. Namely, the aspect relating to parallel processing is not even remotely hinted at in any of the cited references or in the Office Action. Under MPEP §2142 and 2143.03 "To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)."

The Office Action fails to address the explicitly claimed limitations and therefore fails to establish a prima facie case of obviousness.

I. Dependent Claims 12, 13, 14, and 26 Are Patentable Over The Prior Art

Dependent claims 12 and 26 provide for selecting an encoded image quality of one of the plurality of frames and deciding whether the encoded size associated with the encoded image quality satisfies a constraint based on transmission bandwidth, receiver buffering, total compressed size, or

receiver prebuffering. Dependent claim 13 depends on claim 12 and provides that the deciding is based on two of the following: transmission bandwidth, receiver buffering, and receiver prebuffering. Dependent claim 14 depends on claim 12 and further provides for determining the encoded size from the form of the functional relation between the encoded quality and the encoded size for the associate frame.

Similar to other rejections, the Office Action merely asserts "Note claims 4-6, 12-14, 21, and 26-31 have similar corresponding elements."

Such a rejection completely fails to address the limitation of these dependent claims. Namely, the aspect relating to the constraint and the decision limitations are completely lacking from the cited references and the Office Action. Under MPEP §2142 and 2143.03 "To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)."

The Office Action fails to address the explicitly claimed limitations and therefore fails to establish a prima facie case of obviousness.

J. Dependent Claim 15 Is Patentable Over The Prior Art

Dependent claim 15 provides for selecting a plurality of qualities that has a closest value to the best quality value and transmitting frames encoded with such a quality value.

In rejecting this claim, the Office Action merely ignores the claim limitations and groups the rejection into the rejection of claims 9-11. Under MPEP §2142 and 2143.03 "To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)."

The Office Action fails to address the explicitly claimed limitations and therefore fails to establish a prima facie case of obviousness.

K. Dependent Claims 27, 28, and 30 Are Patentable Over The Prior Art

Dependent claims 27, 28, and 30 provide for the situation when the encoded frames do not satisfy the constraints. In such a situation, a new separate function is determined based on the prior separate function and the process is repeated with the new function.

In rejecting these claims, the Office Action merely states "Note claims 4-6, 12-14, 21, and 26-31 have similar corresponding elements."

Such a rejection completely fails to address the limitation of these dependent claims. Namely, the aspect relating to the failure to satisfy constrains and the determination of a new separate function based on a prior function is not even remotely hinted at in any of the cited references or in the Office Action. Under MPEP §2142 and 2143.03 "To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)."

The Office Action fails to address the explicitly claimed limitations and therefore fails to establish a prima facie case of obviousness.

L. Conclusion

In light of the above arguments, Appellants respectfully submit that the cited references do not anticipate nor render obvious the claimed invention. More specifically, Appellants' claims recite novel physical features which patentably distinguish over any and all references under 35 U.S.C. §§ 102 and 103. As a result, a decision by the Board of Patent Appeals and Interferences reversing the Examiner and directing allowance of the pending claims in the subject application is respectfully solicited.

Respectfully submitted,

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CLAIMS APPENDIX

1. A process for encoding data, comprising:

determining a separate function for each frame in a sequence of frames, each function relating encoding size to encoded quality for each frame in the sequence of frames, each frame having data for an image;

prior to encoding any of the frames, performing a search of all of the separate functions to determine a best quality value for encoding the sequence of frames, whose encoded sizes satisfy one or more constraints, the constraints being associated with one of a transmission line bandwidth, a receiver buffer size and total compressed size;

encoding each frame of the entire sequence of frames with the determined best quality value;

determining whether each encoded frame satisfies the constraints; and

if the encoded frames satisfy the constraints, transmitting the sequence of encoded frames.

2. (CANCELLED)

3. (CANCELLED)

4. The process of claim 1, wherein the search reduces the search range for said best quality value by subdivision.

5. The process of claim 1 wherein said search is a subdivision search algorithm.

6. The process of claim 1 wherein said search is a binary search algorithm.

7. (CANCELLED)

8. The process of claim 1, wherein each encoded frame produces a group of temporally encoded pictures.

9. The process of claim 1, wherein each act of determining a separate function, further comprises:

computing a plurality of pairs of encoded quality and encoded size values for each frame of the sequence from encoded frame data; and

determining a functional relationship between values of the encoded quality and the encoded size for the quality of frames from the pairs of values.

10. The process of claim 9, wherein the computing further comprises:

encoding each frame of the sequence with a plurality of qualities to compute encoded data sizes associated with each of the plurality of qualities.

11. The process of claim 1, wherein the determining of separate functions is performed across the sequence of frames on multiple processors in parallel.

12. The process of claim 1, wherein the determining of a best quality value further comprises:

selecting an encoded image quality of one of the plurality of frames; and

deciding whether the encoded size associated with the encoded image quality satisfies a constraint based on one of transmission bandwidth, receiver buffering, total compressed size, and receiver prebuffering.

13. The process of claim 12, wherein the deciding is based on two of the transmission bandwidth, receiver buffering, and receiver prebuffering.

14. The process of claim 12, further comprising:

determining the encoded size associated with each encoded image quality from the form of the functional relation between the encoded quality and the encoded size for the associated frame.

15. The process of claim 10, wherein the transmitting comprises:

selecting the one of the plurality of qualities having a closest value to the best quality value; and wherein the transmitting sends frames encoded with the selected quality.

16. A system for encoding image frames, the system comprising:

(a) a controller connected to receive data on sizes of image frames that are part of a sequence of image frames, to be encoded by the encoder and to control quality of the encoded frames produced by the encoder based on:

(i) a determination of a separate function for each image frame in the sequence of image frames, each function relating encoding size to encoded quality for each frame in the sequence of frames;

(ii) a search of all of the separate functions to determine a best quality value for encoding the sequence of frames whose encoded sizes satisfy one or more constraints, the constraints being associated with one of a bandwidth of a transmission line, space in a receiver buffer and a total compressed size; and

(b) a variable bit rate encoder controlled by the controller configured to encode each frame of the entire sequence of frames with the determined best quality value, wherein the controller is further configured to determine whether each encoded frame satisfies the constraints, and if the encoded frames satisfy the constraints, transmitting the sequence of encoded frames.

17. The system of claim 16, wherein the controller is configured to determine a relation between quality of an encoded image frame and amount of encoded data from the received size data.

18. The system of claim 16, wherein the controller is configured to determine a best quality value for encoding an image frame from size data on data frames encoded with different qualities.

19. A computer readable storage media storing a computer program including executable instructions, the instructions to cause a computer to:

determine a separate function for each frame in a sequence of frames, each function relating encoded size to encoded quality for each frame in the sequence of frames, each frame having data for an image;

prior to encoding any of the frames, perform a search of all of the separate functions to determine a best quality value for encoding the sequence of frames whose encoded sizes satisfy one or

more constraints, the constraints being associated with one or more of a transmission line bandwidth, a receiver buffer size and a total size constraint;

encode each frame of the entire sequence of frames with the determined best quality value;

determine whether each encoded frame satisfies the constraints; and

if the encoded frames satisfy the constraints, order transmission of frames of the sequence.

20. (CANCELLED)

21. The media of claim 19 wherein said search is a binary search algorithm.

22. (CANCELLED)

23. The media of claim 19, wherein each encoded frame produces a group of temporally encoded pictures.

24. The media of claim 19, wherein each instruction to determine a separate function, further causes the computer to:

compute a plurality of pairs of encoded quality and encoded size values for each frame of the sequence from encoded frame data; and

determine a functional relationship between values of the encoded quality and the encoded size for the plurality of frames from the pairs of values.

25. The media of claim 24, wherein the instruction to compute further causes the computer to:

encode each frame of the sequence with a plurality of qualities to computer encoded data sizes associated with each of the plurality of qualities.

26. The media of claim 19, wherein the instruction to determine a best quality value, further causes the computer to:

select an encoded image quality of one of the plurality of frames; and

decide whether the encoded size associated with the encoded image quality satisfies a constraint based on one of transmission bandwidth, receiver buffering, and receiver prebuffering.

27. The process of claim 1 wherein if one of more of the encoded frames do not satisfy the constraints:

determining a new separate function based on the prior separate function determining and search; and

repeating the performing a search, encoding, and determining whether each encoded frame satisfies the constraints steps based on the new function.

28. The system of claim 16 wherein if one of more of the encoded frames do not satisfy the constraints, the controller:

determines a new separate function based on the prior separate function determining and search;

repeats the search of all of the frames;

causes the encoder to encode each frame of the entire sequence based on the new form; and

repeats the determining of whether each encoded frame satisfies the constraints.

29. The system of claim 16, wherein the controller is configured to determine the separate functions across the sequence of frames on multiple processors in parallel.

30. The media of claim 19 wherein if one of more of the encoded frames do not satisfy the constraints, the instructions cause the computer to:

determine a new separate function based on the prior separate function determining and search; and

repeat the performing a search, encoding, and determining whether each encoded frame satisfies the constraints steps based on the new function.

31. The media of claim 19, wherein the instructions cause the computer to determine the functions across the sequence of frames on multiple processors in parallel

EVIDENCE APPENDIX

NONE

RELATED PROCEEDINGS APPENDIX

NONE